Notice of Determination & Addendum to Rationale

General NPDES Permit for Discharges of Treated Groundwater Associated with **Underground Storage Tank Remediation – TNG830000 February 20, 2003**

I. Background

In 1997, the Tennessee Department of Environment and Conservation issued a general permit for discharges of treated groundwater associated with underground storage tank remediation. The permit expired January 19, 2002.

The department put a draft permit on public notice September 10, 2001, and held a public hearing on October 21, 2002. No comments were received from the public.

In the period from October 2002 to February 2003, the division received comments from the U.S. Environmental Protection Agency (EPA), and the Division of Underground Storage Tanks on the draft permit.

II. Comments and responses to comments

Comment: The draft permit proposes a daily maximum limitation for total recoverable lead of 0.03 mg/L, which may not be protective of water quality-based criterion continuous concentration in a case of continuous discharges into zero low-flow receiving streams. Furthermore, both monthly average and daily maximum limits should be applied to continuous discharges into zero lowflow receiving streams.

Response:

Process wastewater discharges of treated groundwater associated with underground storage tank remediation can be intermittent or continuous. The table below shows division's standardized calculations for establishing allowable effluent concentrations protective of receiving stream designated uses (acute and chronic criteria). For acute and chronic criteria, EPA recommends averaging periods of 1 hour and 4 days, respectively. Please note that stream background concentration, listed at 50% of allowable chronic number, does not affect the result, since the receiving stream flow is 0 MGD.

Ttl. Susp.

Solids

Hardness

(as CaCO3)

Stream

Allocation

	[MGD]	[MGD]	[MGD]	[mg/l]	[mg/l]	[%]		
	0.000	0.000	1.000	10	50	100		
				-			-	
	Stream	Fish/	Aqua. Life	Effluent	Fish & A	quatic Life Wate	er Quality Criteri	a (1Q10)
	Bckgrnd.	Water Quality Criteria		Fraction	In-Stream Allowable		Calc. Effluent Concentration	
EFFLUENT	Conc.	Chronic	Acute	Dissolved	Chronic	Acute	Chronic	Acute
CHARACTERISTIC	[ug/l]	[ug/l]	[ug/l]	[Fraction]	[ug/l]	[ug/l]	[ug/l]	[ug/l]
Lead *	3.193	1.174	30.136	0.184	6.386	163.870	6.4	163.9

Waste

(1Q10)

(3002)

	Human Health Water Quality Criteria (30Q2)				
In-Stream Criteria			Calc. Effluent Concentration		
Organisms	Vater/Organism	DWS	Organisms	Vater/Organism	DWS
[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]
NA	NA	5.0	NA	NA	5.0

Denotes metal for which Fish & Aquatic Life Criteria are expressed as a function of total hardness. The Fish & Aquatic Life criteria for this metal are in the dissolved form at laboratory conditions. The in-stream allowable criteria and calculated effluent concentrations are in the total recoverable form. NOTE: Water Quality criteria for stream use classifications other than Fish & Aquatic Life are based on the 30Q2 flow. However, the calculated effluent concentration was based on the zero low-flow conditions, which is not in accord with an underlying concept of a receiving stream being used as a source for domestic water supply on a continuous basis.

If a continuous flow of treated groundwater is discharged into a zero low-flow receiving stream, such effluent has to be protective of in-stream criteria for total recoverable lead. Therefore, assuming the most conservative discharge scenario (zero low-flow receiving stream, continuous discharge), the total recoverable lead limitation will be established at 0.006 mg/L. This limitation will apply only to those treatment systems that are discharging continuously for more than 4 days at any period of time into a zero low-flow receiving stream. The applicable critical low-flow values are determined using USGS data from: "Flow Duration and Low Flows of Tennessee Streams through 1992 by George S. Law and Jess D. Weaver. Water Resources Investigations Report 95-4293 prepared by the U.S. Geological Survey in Cooperation with the Tennessee Department of Environment and Conservation and the Tennessee Valley Authority, Nashville, Tennessee, 1996" (or the most current edition, or other appropriate USGS sources).

The total recoverable lead limitation for intermittent discharges, and discharges into streams that are not zero low-flow, must comply with the total recoverable lead limitation of 0.164 mg/L, protective of receiving stream acute in-stream criteria.

Therefore, discharges covered by this permit must comply with the following numerical effluent limits:

Parameter	Effluent Limitation
Benzene	0.005 mg/L as a daily maximum concentration
Ethyl benzene	0.010 mg/L as a daily maximum concentration
Toluene	0.010 mg/L as a daily maximum concentration
Xylene	0.010 mg/L as a daily maximum concentration
Lead, total recoverable	0.164 mg/L as a daily maximum concentration
Lead, total recoverable	0.006 mg/L as a monthly average concentration *
Total Suspended Solids (TSS)	40.0 mg/L as a daily maximum concentration
Floating Material, Color,	No distinctly visible floating scum, oil or other matter
Foam and Oil Sheen	
pН	6.5 - 9.0 (range)
IC25	Survival, Reproduction, & Growth in 100 % effluent
48 Hour LC50	Survival in 100 % effluent

^{*} In addition to the daily maximum concentration limitation for total recoverable lead, monthly average limitation will apply to those treatment systems that are discharging continuously for more than 4 days at any period of time into a zero low-flow receiving stream.

Comment:

Whole effluent toxicity (WET) limitations for all permittees should be set at 100% effluent. Furthermore, if the 7Q10 is barely above zero - 0.001 cfs (to take an extreme example), acute testing and limits apply, rather than chronic. Although most of these discharges may be small in relation to the receiving stream flow, if one wanted to be a bit more conservative to make sure that chronic effects do not occur in low flow streams, use of a 10% IWC or lower would trigger use of chronic limitation rather than acute.

Response:

WET toxicity in the proposed UST GP is set at 100% effluent for all permittees. The change from the previous permit was a <u>type</u> of testing used, based on the receiving stream low-flow conditions (see text below). Using the same approach as in the division's individual NPDES permits, based on the memorandum of agreement with the U.S. EPA, the final version of the permit will establish type of testing based on the dilution ratio between effluent and a receiving stream. In order to reflect EPA's recommendations, WET testing requirements in the final permit were modified, using the rationale and verbiage detailed in the text below.

Because the treated discharge may contain some level of toxic substances, i.e. benzene, ethylbenzene, toluene, the division feels toxicity testing is necessary to insure the discharges

will not adversely affect the quality of the receiving waters. Based on current individual NPDES permit requirements, and that proper performance of treatment equipment can reduce or eliminate effluent toxicity, the permit will require that 100% effluent have no toxicity. The WET tests to be used are IC25 (chronic test; Survival, Reproduction, & Growth in 100 % effluent) and 48 Hour LC50 (acute test; Survival in 100 % effluent). The species shall be the water flea (Ceriodaphnia Dubia) and the fathead minnow (Pimephales Promelas). Toxicity will be demonstrated if the 48 Hour LC50 or IC25 is less than or equal to the permit limit (100 % effluent).

The type of WET testing applicable to any discharge depends on the receiving stream low flow conditions. The critical low flow values are determined using the U.S. Geological Survey (USGS) data from: "Flow Duration and Low Flows of Tennessee Streams through 1992 by George S. Law and Jess D. Weaver. Water Resources Investigations Report 95-4293 prepared by the U.S. Geological Survey in Cooperation with the Tennessee Department of Environment and Conservation and the Tennessee Valley Authority, Nashville, Tennessee, 1996" (or the most current edition, or other appropriate USGS sources). The applicable critical low flow values for Fish and Aquatic Life Protection are: 7Q10 for low flow under natural conditions and 1Q10 for regulated conditions (e.g. downstream from dams).

Discharges into zero (0) low flow receiving streams and streams that provide dilution factor up to 100:1 will have to comply with the numerical effluent limitation for IC25. Discharges with dilution factor of receiving stream to effluent between 100:1 and 500:1 will have to comply with the numerical effluent limitation for 48 hour LC50. If the calculated dilution factor is more than 500:1, and assuming immediate and complete mixing, the permittee can request a waiver of the whole effluent toxicity testing requirement. This information is summarized in the table below:

Dilution Factor	0-100	100-500	>500
Type of WET testing	IC25	LC50	No Testing Required
Percent Effluent	100%	100%	Not Applicable

Calculation of dilution factor is as follows:

$$\begin{array}{c} Qs + Qw \\ DF = ----- = Dilution \ Factor \\ Ow \end{array}$$

where Qw is a long-term average treated groundwater (effluent) flow rate and Qs is a receiving stream low flow rate (7Q10 or 1Q10, see text above). The waiver of the whole effluent toxicity testing shall be made in writing to the division's local Environmental Assistance Center.

Whole Effluent Toxicity Testing, Chronic

The permittee shall conduct a 3-Brood *Ceriodaphnia dubia* Survival and Reproduction Test and a 7-Day Fathead Minnow (*Pimephales promelas*) Larval Survival and Growth Test on the same samples of final effluent. The measured endpoint for toxicity will be the inhibition concentration causing 25% reduction (IC25) in survival, reproduction, or growth of the test organisms. The IC25 shall be determined based on a 25% reduction as compared to the controls. The average reproduction and growth responses will be determined based on the number of *Ceriodaphnia dubia* or *Pimephales promelas* larvae used to initiate the test.

Test shall be conducted and its results reported based on appropriate replicates of a total of five serial dilutions and a control, using the percent effluent dilutions as presented in the following table:

Serial Dilutions for Whole Effluent Toxicity (WET) Testing					
Permit Limit (PL)	0.50 X PL	0.25 X PL	0.125 X PL	0.0625 X PL	Control
% effluent					
100	50	25	12.5	6.25	0

The dilution/control water used will be a moderately hard water as described in Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms, EPA-821-R-02-013, or the most current edition. Results from a chronic standard reference toxicant quality assurance test for each species tested shall be submitted with the discharge monitoring report. Reference toxicant tests shall be conducted as required in EPA-821-R-02-013 (or the most current edition).

Toxicity will be demonstrated if the IC25 is less than or equal to the permit limit indicated in the above table. Toxicity demonstrated by the tests specified herein constitutes a violation of this permit.

All tests will be conducted using a minimum of three 24-hour flow-proportionate composite samples of final effluent collected on days 1, 3 and 5. If, in any control more than 20% of the test organisms die in 7 days, the test (control and effluent) is considered invalid and the test shall be repeated within 30 days of the date the initial test is invalidated. Furthermore, if the results do not meet the acceptability criteria of section 4.9.1, EPA-821-R-02-013 (or the most current edition), that test shall be repeated. Any test initiated but terminated before completion must also be reported along with a complete explanation for the termination.

In the event of a test failure, the permittee must start a follow-up test within 2 weeks and submit results from a follow-up test within 30 days from obtaining initial WET testing results. The follow-up test must be conducted using the same serial dilutions as presented in the corresponding table above. The follow-up test will not negate an initial failed test. In addition, the failure of a follow-up test will constitute a separate permit violation which must also be reported.

In the event of 2 consecutive test failures or 3 test failures within a 12 month period for the same outfall, the permittee must initiate a Toxicity Identification Evaluation/Toxicity Reduction Evaluation (TIE/TRE) study within 30 days and so notify the division by letter. This notification shall include a schedule of activities for the initial investigation of that outfall. During the term of the TIE/TRE study, the frequency of biomonitoring shall be once every three months. Additionally, the permittee shall submit progress reports once every three months throughout the term of the TIE/TRE study. The toxicity must be reduced to allowable limits for that outfall within 1 year of initiation of the TIE/TRE study. Subsequent to the results obtained from the TIE/TRE studies, the permittee may request an extension of the TIE/TRE study period if necessary to conduct further analyses. The final determination of any extension period will be made at the discretion of the division.

The TIE/TRE study may be terminated at any time upon the completion and submission of 2 consecutive tests (for the same outfall) demonstrating compliance. Following the completion of TIE/TRE study, the frequency of monitoring will return to a regular schedule, as defined previously in this section. During the course of the TIE/TRE study, the permittee will continue to conduct toxicity testing of the outfall being investigated at the frequency of once every three

months but will not be required to perform follow-up tests for that outfall during the period of TIE/TRE study.

Test procedures, quality assurance practices, determinations of effluent survival/reproduction and survival/growth values, and report formats will be made in accordance with Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms, EPA-821-R-02-013, or the most current edition.

Results of all tests, reference toxicant information, copies of raw data sheets, statistical analysis and chemical analyses shall be compiled in a report. The report will be written in accordance with Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms, EPA-821-R-02-013, or the most current edition.

Two copies of biomonitoring reports (including follow-up reports) shall be submitted to the division. One copy of the report shall be submitted along with the discharge monitoring report (DMR). The second copy shall be submitted to the local Environmental Assistance Center.

Whole Effluent Toxicity Testing, Acute

The permittee shall conduct a 48-hour static acute toxicity test on two test species on the same samples of final effluent. The test species to be used are Water Fleas (*Ceriodaphnia dubia*) and Fathead Minnows (*Pimephales promelas*).

The measured endpoint for toxicity will be the concentration causing 50% lethality (LC50) of the test organisms. The LC50 shall be determined based on a 50% lethality as compared to the controls.

Test shall be conducted and its results reported based on appropriate replicates of a total of five serial dilutions and a control, using the percent effluent dilutions as presented in the following table:

Serial Dilutions for Whole Effluent Toxicity (WET) Testing					
Permit Limit (PL)	0.50 X PL	0.25 X PL	0.125 X PL	0.0625 X PL	Control
% effluent					
100	50	25	12.5	6.25	0

The dilution/control water used will be a moderately hard water as described in Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms, EPA-821-R-02-012 (or the most current edition). Results from an acute standard reference toxicant quality assurance test for each species tested shall be submitted with the discharge monitoring report. Reference toxicant tests shall be conducted as required in EPA-821-R-02-012 (or the most current edition).

Toxicity will be demonstrated if the LC50 is less than or equal to the permit limit indicated in the above table. Toxicity demonstrated by the tests specified herein constitutes a violation of this permit.

All tests will be conducted using four separate grab samples of final effluent, to be used in four separate tests, and shall be collected at evenly spaced (6-hour) intervals over a 24-hour period.

If, in any control more than 20% of the test organisms die in 48 hours, the test (control and effluent) is considered invalid and the test shall be repeated within 30 days of the date the initial test is invalidated. Furthermore, if the results do not meet the acceptability criteria as defined in Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms, EPA-821-R-02-012, that test shall be repeated. Any test initiated but terminated before completion must also be reported along with a complete explanation for the termination.

In the event of a test failure, the permittee must start a follow-up test within 2 weeks and submit results from a follow-up test within 30 days from obtaining initial WET testing results. The follow-up test must be conducted using the same serial dilutions as presented in the corresponding table(s) above. The follow-up test will not negate an initial failed test. In addition, the failure of a follow-up test will constitute a separate permit violation which must also be reported.

In the event of 2 consecutive test failures or 3 test failures within a 12 month period for the same outfall, the permittee must initiate a Toxicity Identification Evaluation/Toxicity Reduction Evaluation (TIE/TRE) study within 30 days and so notify the division by letter. This notification shall include a schedule of activities for the initial investigation of that outfall. During the term of the TIE/TRE study, the frequency of biomonitoring shall be once every three months. Additionally, the permittee shall submit progress reports once every three months throughout the term of the TIE/TRE study. The toxicity must be reduced to allowable limits for that outfall within 1 year of initiation of the TIE/TRE study. Subsequent to the results obtained from the TIE/TRE studies, the permittee may request an extension of the TIE/TRE study period if necessary to conduct further analyses. The final determination of any extension period will be made at the discretion of the division.

The TIE/TRE study may be terminated at any time upon the completion and submission of 2 consecutive tests (for the same outfall) demonstrating compliance. Following the completion of TIE/TRE study, the frequency of monitoring will return to a regular schedule, as defined previously in this section as well in Part I of the permit. During the course of the TIE/TRE study, the permittee will continue to conduct toxicity testing of the outfall being investigated at the frequency of once every three months but will not be required to perform follow-up tests for that outfall during the period of TIE/TRE study.

Test procedures, quality assurance practices and determination of effluent lethality values will be made in accordance with Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms, EPA-821-R-02-012, or the most current edition.

Results of all tests, reference toxicant information, copies of raw data sheets, statistical analysis and chemical analysis shall be compiled in a report. The report shall be written in accordance with Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms, EPA-821-R-02-012, or the most current edition.

Two copies of biomonitoring reports (including follow-up reports) shall be submitted to the division. One copy of the report shall be submitted along with the discharge monitoring report (DMR). The second copy shall be submitted to the local Environmental Assistance Center.

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Comment: Standard permit conditions, specifically Part L: Inspection and Entry, should make an explicit

provision that U.S. EPA and EPA's authorized representatives are allowed to inspect any

facilities or equipment at reasonable times.

Response: In order to reflect EPA's recommendations, Part L was modified as follows:

"The permittee shall allow the division or an authorized representative of the division, the U.S. EPA or an authorized representative of the U.S. EPA or, in the case of a site that discharges through a municipal separate storm sewer, an authorized representative of the municipal operator or the separate storm sewer receiving the discharge, upon the presentation of credentials and other documents as may be required by law, to: enter upon the permittee's premises where a regulated site or activity is located or conducted or where records must be kept under the conditions of this permit; have access to and copy at reasonable times, any records that must be kept under the conditions of this permit; and inspect at reasonable times any facilities or equipment (including monitoring and control equipment)."

The permit is being revised according to the above responses to comment. The division believes the permit as revised will protect the classified uses of the streams in Tennessee and will issue the permit on March 3, 2003, with an effective date of March 4, 2003.

Date:	
	Saya Ann Qualls, P.E.
	Manager, Permit Section